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#### ABSTRACT OF THE DISCLOSURE

Disclosed is a method for manufacturing a diamond film of electronic quality at a high rate using a pulsed microwave plasma. The plasma that has a finite volume is formed near a substrate (in a vacuum chamber) by subjecting a gas containing at least hydrogen and carbon to a pulsed discharge. The pulsed discharge has a succession of low-power states and of high-power states, and a peak absorbed power  $P_c$ , in order to obtain carbon-containing radicals in the plasma. These carbon-containing radicals are deposited on the substrate in order to form a diamond film. Power is injected into the volume of the plasma with a peak power density of at least  $100 \text{ W/cm}^3$ , while maintaining the substrate to a substrate temperature of between  $700^\circ\text{C}$  and  $1000^\circ\text{C}$ .